

# **Strategies to Improve Post Vaccination Testing Rates Among Infants Born to Hepatitis B-Infected Mothers**

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**Texas Perinatal Hepatitis B Prevention Summit  
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# **New York City Perinatal Hepatitis B Prevention Program (NYC PHBPP)**



# New York City Statistics

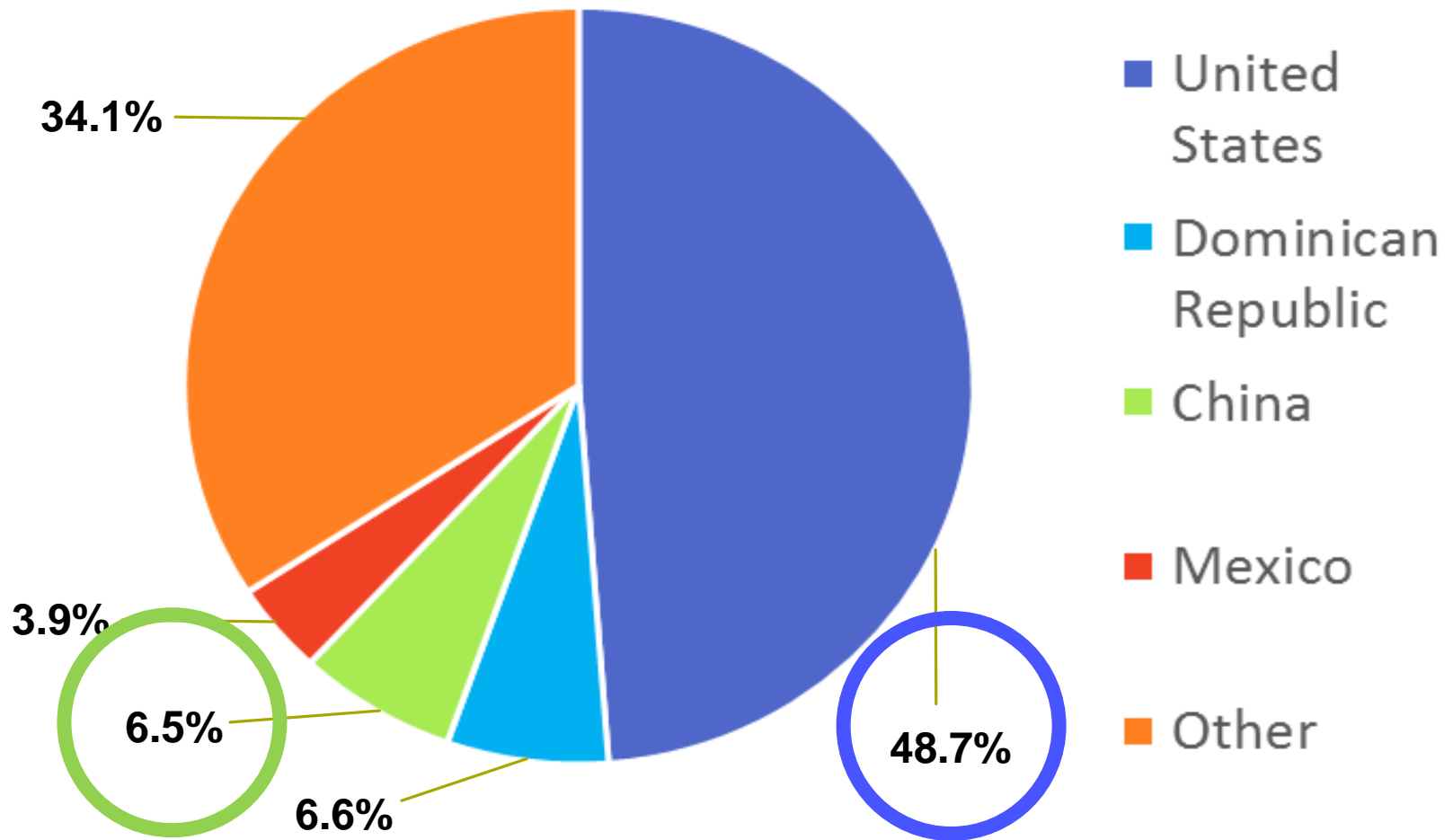
- **Population: 8.6 million residents**
  - **>3 million are foreign-born (35%)**
- **121,673 births in NYC in 2015**
  - **39 delivery facilities**
  - **51% of new mothers were foreign-born**
- **Birth dose coverage**
  - **2017 – 72.3%**





# All Live Births, 2015, NYC

## Mother's Birthplace



# NYC PHBP Organization Structure

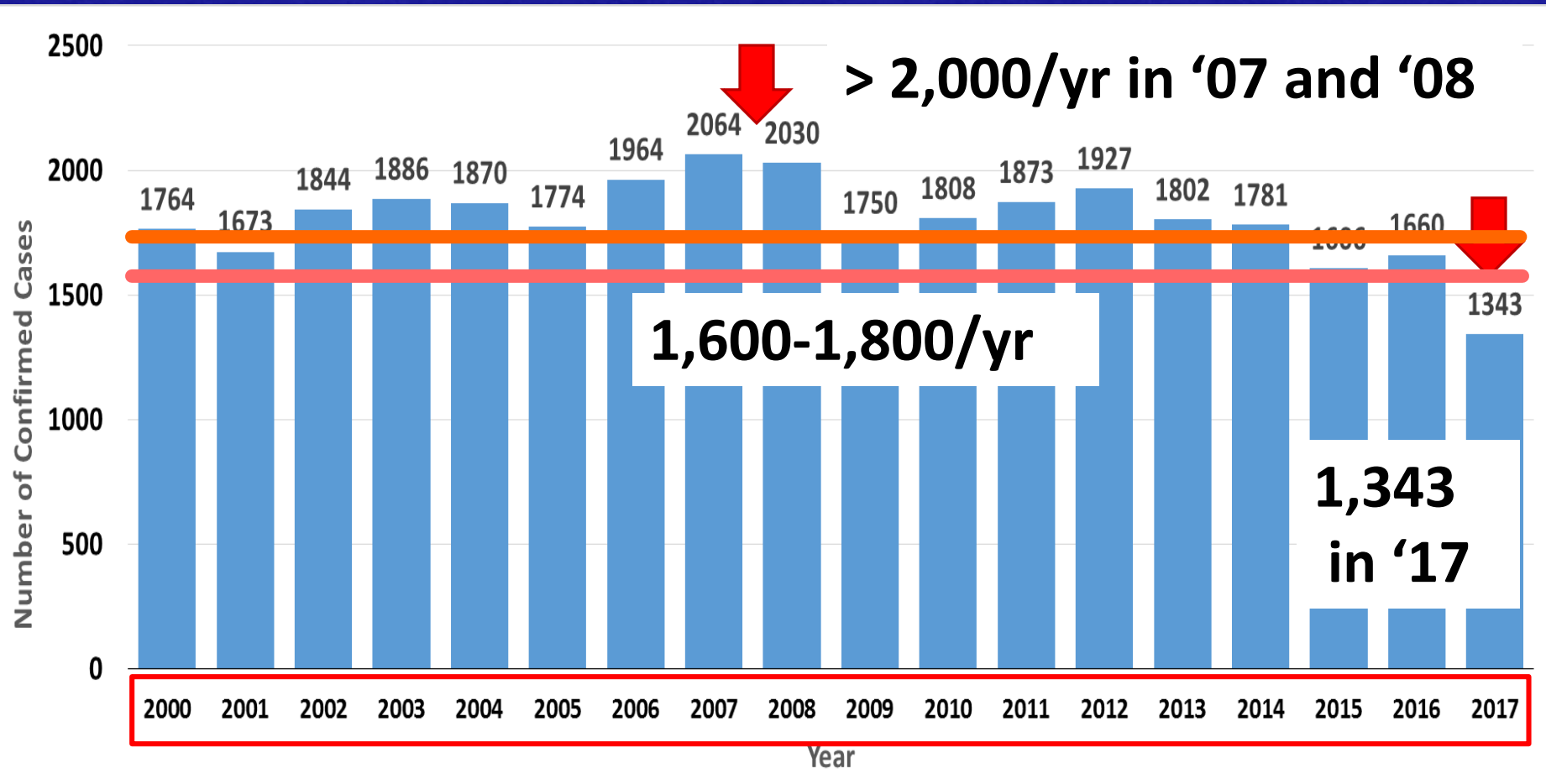
- **The NYC PHBPP**
  - **Bureau of Immunization (BOI)**
  - **NYC Department of Health and Mental Hygiene (NYC DOHMH)**
- **18 Employees (CDC Immunization Program Grant)**
  - **PHBP Coordinator: Unit Chief**
  - **Epidemiologist**
  - **Supervisors /Public Health Advisors (PHAs): 12**
    - **Bilingual in Chinese/English**
  - **Administrative/Clerical: 4**

# Surveillance of Hep B-infected Pregnant Women

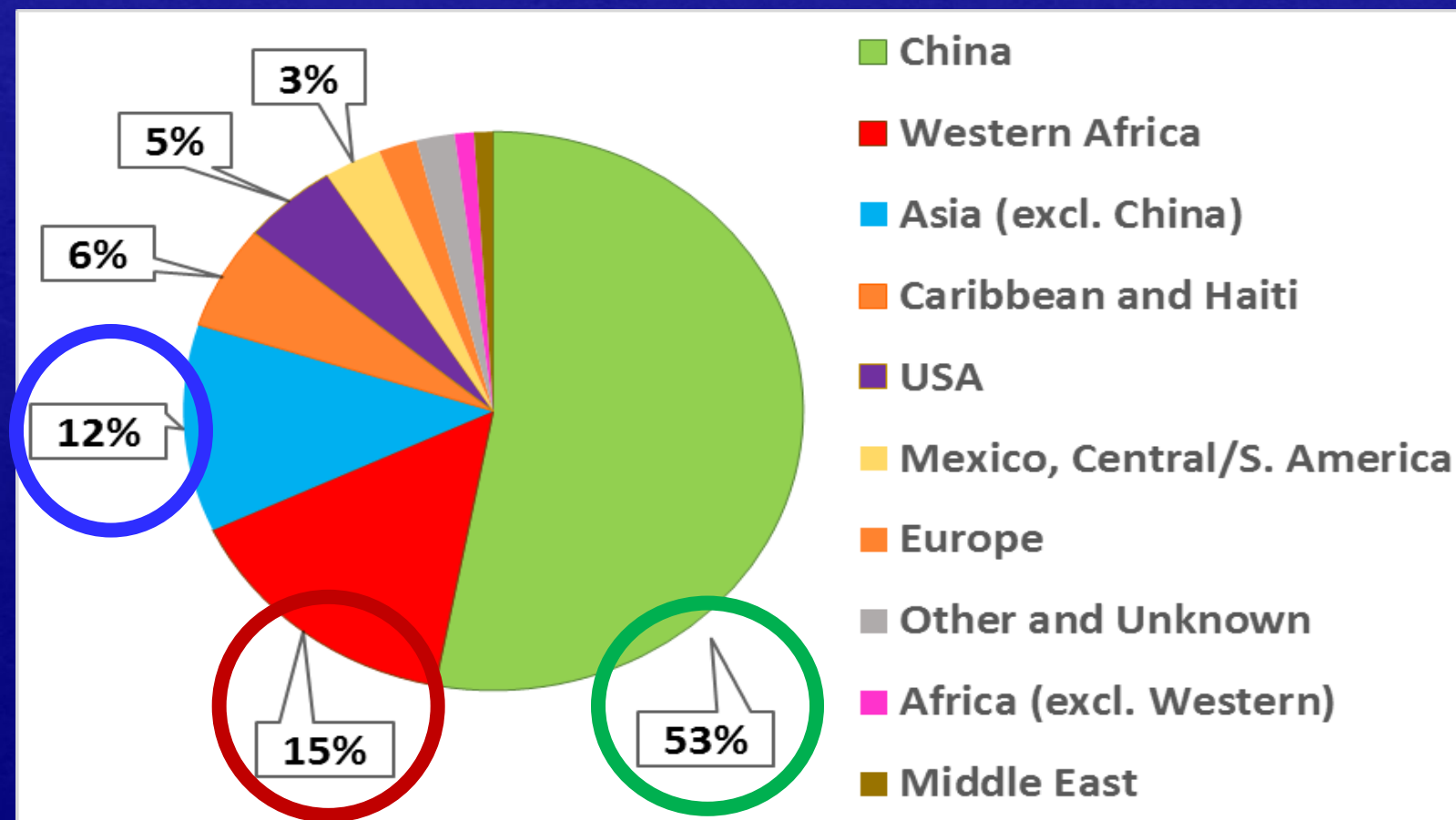
- In New York State, since 1990, providers have been required to test all pregnant women for hepatitis B (hep B)
  - Reporting requirements
- Cases are reported to the PHBP Unit by laboratories, prenatal care providers, delivery facilities and newborn screening card data
- PHAs confirm cases before contacting the patient



# Hep B-infected Pregnant Women NYC, 2000-2017



# Region of Birth Hep B-infected Mothers 2017, NYC (n=1256)



# Mothers Born in China

- 15%-20% of the mothers who born in China will move back to China or send their infant to China
- Infants return to NYC when school age
  - Case management continues while child is in China
- May be lost to follow-up and found again when mother is pregnant again
  - May be case managed as contacts



# Case Management

## Interview and Health Education

- Initial and/or post-partum interview
  - Maternal demographics, risk factors and related medical data
  - Hep B disease and routes of transmission
  - Immunization and testing schedules and recommendations
  - Hep B evaluation during and after pregnancy
  - Identify contacts
  - Plans after delivery

# Case Management

## Vaccination and Testing

- Reminders to provider and mother for infant and child contact vaccination and testing
- Documentation of vaccinations
  - NYC Citywide Immunization Registry (CIR)
    - 90% of vaccinations for PHBP Infants
  - Obtain vaccination records for doses administered outside of NYC which are not found in the CIR
- Documentation of PVST
  - Providers fax lab reports to the PHBP Unit
  - Electronic lab reporting
- Infants vaccinated and/or tested in China
  - Families mail, fax or text message reports

# Case Management

## Infants Born, 2015, NYC (n=1517<sup>±</sup>)

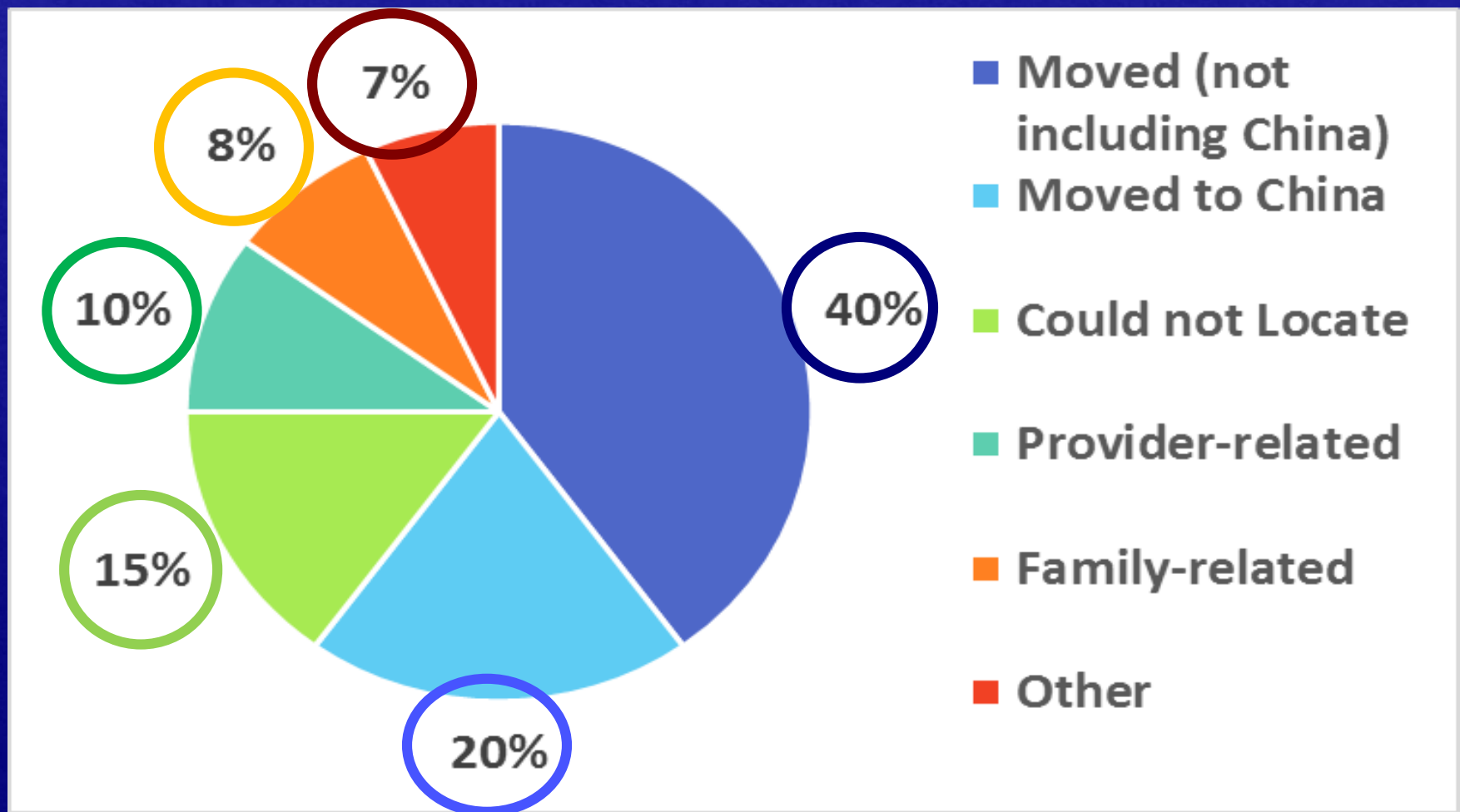
Vaccination	#	%
PEP* Received	1508	99%
Series Completed	1388	91%
<b>PVST</b>		
Tested	1349	89%
Not Tested	168	11%
<b>Total</b>	<b>1517</b>	<b>100%</b>

\*PEP (post-exposure prophylaxis) is defined as the administration of hepatitis B immune globulin (HBIG) and the 1<sup>st</sup> dose of hep B vaccine series within 12 hrs of birth. <sup>±</sup> This includes infants transferred to other U.S jurisdictions.



# Challenges to PVST Completion and Documentation

# PVST Not Documented Infants Born in 2015 (n=168/1517)



# Challenges

## Errors in PVST Orders and Timing

- **PVST errors are not uncommon**
  - **Incorrect tests are ordered**
  - **Testing is performed too early**
  - **Testing is performed too late**
- **PVST errors require recalling the infant**
  - **Providers and families will often push-back**
    - **Anti-HBs (+) alone does not rule out infection**
  - **Delays and failures to obtain PVST documentation**



# Challenges

## Moved or Cannot be Located

- 75% of the infants without PVST documentation were either no longer residing in New York City or could not be located
- Methods to search for families
  - City agency database (HHS Connect)
  - Regional health information organizations (RHIOs)
  - NYC DOH databases (CIR, ECLRS, Maven)
- Families return to NYC, but do not notify the PHBP Unit

# Challenges

## Tracking and Sending Reminders

- PHAs have 150-200 cases to track each year
  - Paper tickler systems require manual calculation of dates and regular maintenance
- Sending reminders to families
  - Scheduling and logging reminders require meticulous organization and consistency
- Families are difficult to reach
  - Knowing how families prefer to be contacted needs to be documented

# Strategies to Improve PVST Completion and Documentation



# Patient and Provider Education on PVST Recommendations

- Both patients and providers should be educated on current ACIP PVST recommendations
  - Patients – verbal / educational pamphlet
  - Providers – quick reference sheets
- Two most important health messages
  - Test for both hepatitis B surface antibody (anti-HBs) and hepatitis B surface antigen (HBsAg) to determine if child is immune, infected or susceptible
  - Test at age 9 - 12 months



# Electronic Lab Reporting of PVST

- Most laboratory reporting laws are for results that indicate disease (hep B infection)
- In July 2014, the NYC DOHMH requested that the Board of Health amend the health code to require reporting of all HBsAg and anti-HBs results (qualitative or quantitative)
  - Age  $\leq$  5 years old
  - Regardless of result (positive, negative and indeterminate)

**Maven®**  
**NYC Vaccine Preventable  
Disease Surveillance  
System**

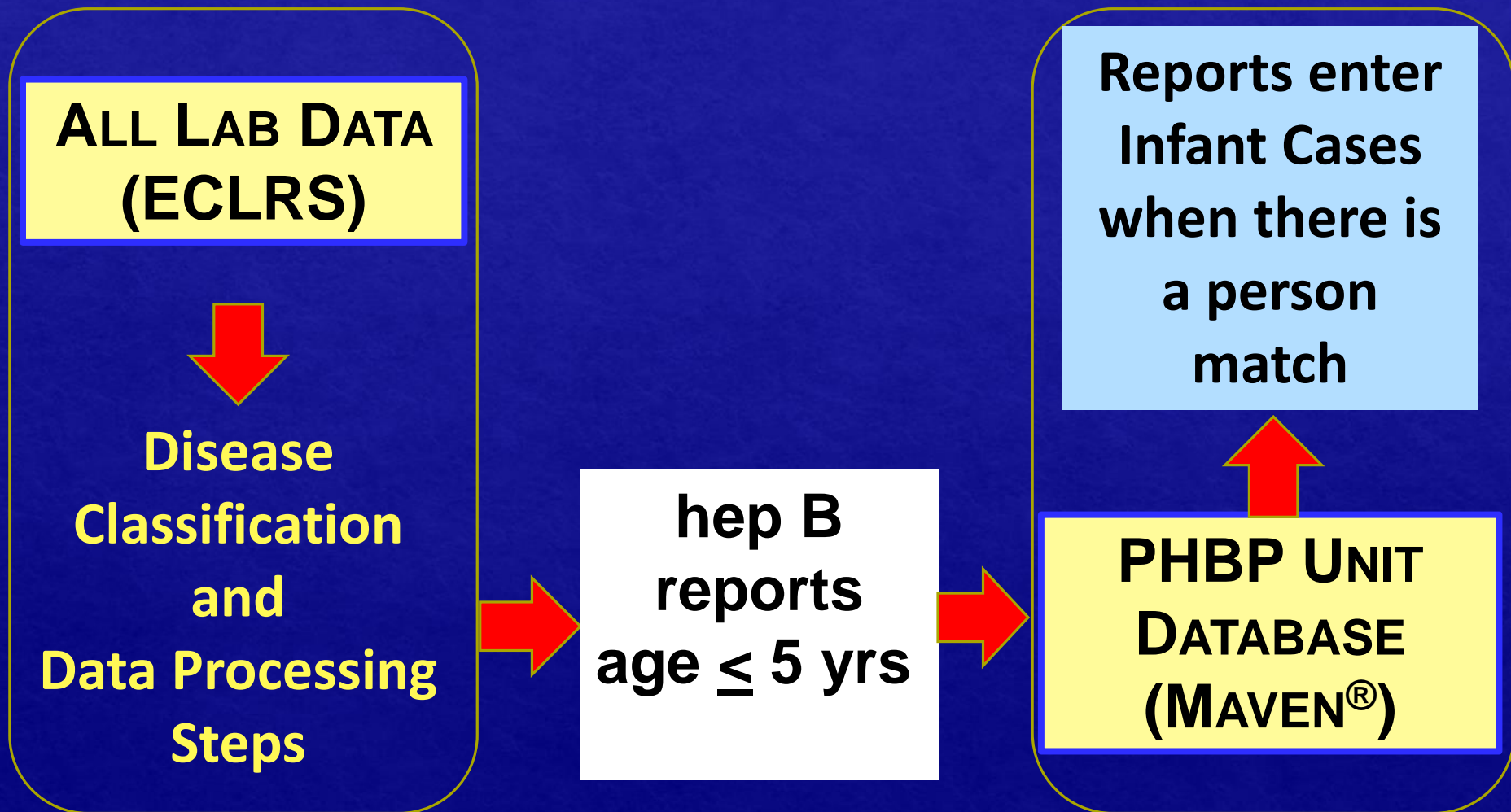
**PHBP Unit  
Case Management Database**

# Overview of VPD Maven Features

- **Automated PVST electronic lab report import functionality**
  - **Leverages Maven matching algorithm**
- **Workflows**
  - **List of events that meet specified criteria for each step in case management**
- **Record family preferences on how to contact**
- **Vaccination and testing reminders log**



# Electronic Lab Imports





# Dashboard Screen Shot

New York City Vaccine Preventable Disease Surveillance System

Event Summary

**Basic Information**

Event ID: 100091697

Disease: **Hepatitis B – Perinatal Infant**

Person:

Address:

Dates:

Investigation Status:

Linked Events/Contacts:

Attachments:

Notifications:

Event Notes (Add/Edit | Show My Notes)

Event is in workflows [View List]

Disease Status: N/A

Event Date: 08/25/2017

Disposition: N/A

Disposition Date: N/A

Age at Event: 0 years 0 months 0 days

Assigned PHA: Willyhawk Huang

Assigned Supervisor: Willyhawk Huang

Event Data | Lab Results | Concerns | Persons | Tasks | Calendar | Event Properties | Event History

**Labs**

Lab No.	Specimen Collection Date	Specimen Source	Test	Result	Antibiotic	Result	Facility Name	Facility Name	Test Reviewed?
▶ 1	05/17/2018	Blood	HBsAg	Negative			BIOREFERENCE LABORATORY	HONG LI, M.D.	
1	05/17/2018	Blood	Anti-HBs	Positive			BIOREFERENCE LABORATORY	HONG LI, M.D.	

# Workflow Specifications

## Infant ECLRS Report Received

- Case may be open or closed
- A new laboratory report enters an infant case
  - Open and update case
  - Update Interpretation data
    - Immune – Close case
    - Infected – Referral to specialist
    - Susceptible – Advise for single dose revaccination

# New York City Vaccine Preventable Disease Surveillance System

## Workflow Details - Infant ECLRS Report Received

Displaying 1...13 of 13 ([Export All](#))

### Infant ECLRS Report Received (Last Update: 05/21/2018 11:07 AM)

Event	Case pending date	Date received
100091697- Clinical	04/19/2018	05/19/2018
100091338- Clinical		05/17/2018
100091308- Clinical		05/15/2018
100091220- Clinical		05/20/2018
100091157- Clinical		05/19/2018
100091105- Clinical		05/20/2018
100090942- Clinical		04/25/2018
100090889- Clinical		05/18/2018
100090443- Clinical		04/20/2018
100088930- Clinical		05/06/2018
100087955- Clinical		05/16/2018
100086126- Clinical		
100085460- Clinical		

**CASE Pending As**

**Transferred w/i US 3/3/2017 10/29/2017**

Filter:  Contains  Apply








# Electronic Lab Results

<b>5/25/2018</b>	Specimen Accession Number*	Specimen Source*	Specimen
	3S624134	<input type="button" value="▼"/>	
<b>Tests</b>			
Test*		Result	
<b>HBsAg</b> <input type="button" value="▼"/>		<b>Negative</b>	
51969HB S AG W/REFLEX CONFL   HB s Ag			
Quantitative Result		Quantitative Result Unit	
<input type="text"/>		<input type="text"/>	

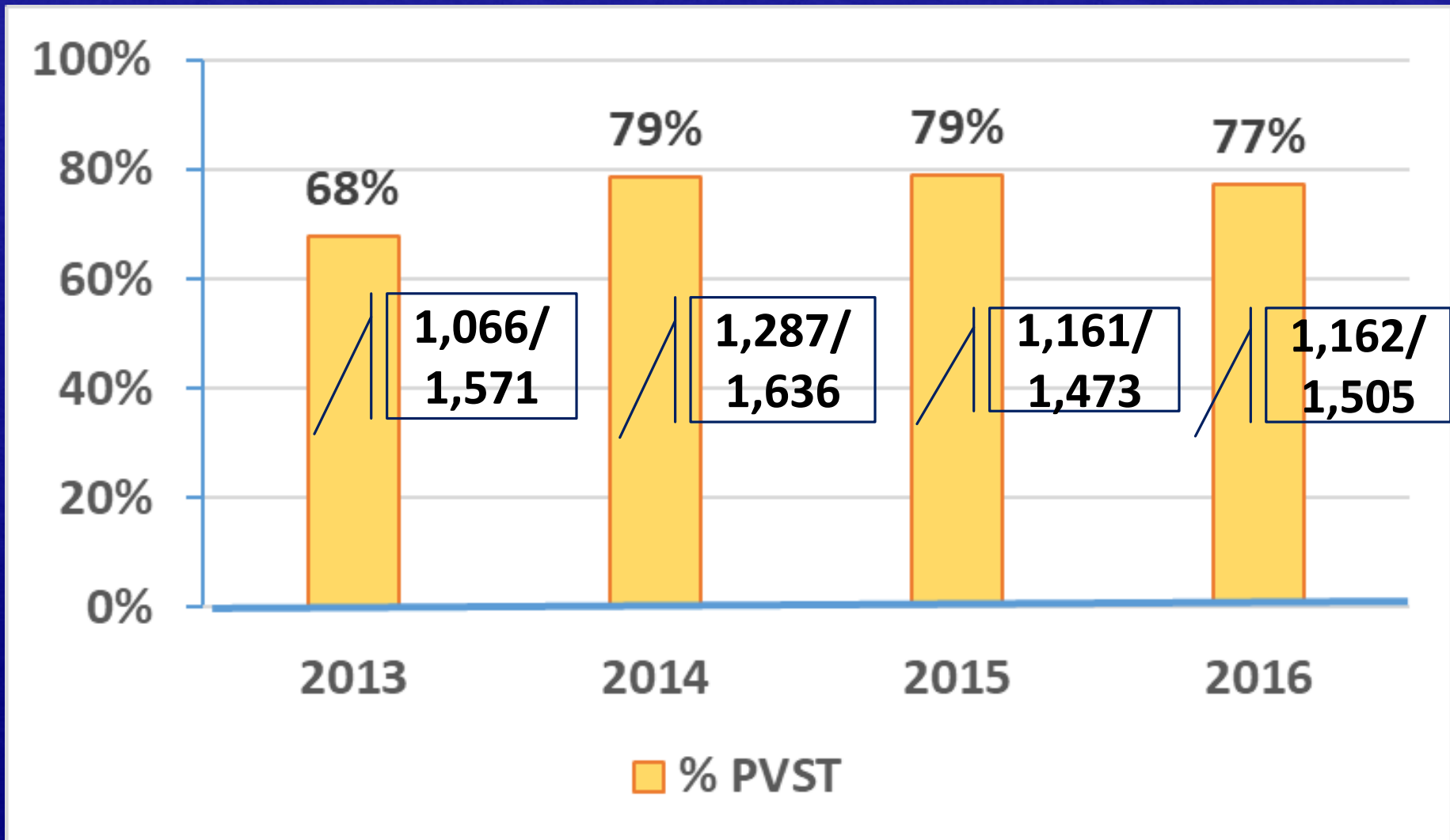
Test*		Result	
<b>anti-HBs</b>		<input type="button" value="None (result will be quantitative) ▼"/>	
41545HEP B SURF AB IMMUNITY,QNL   HB s Ab			
Result			
<b>44</b>	<input type="text"/>	<b>mIU/mL</b>	<input type="text"/>



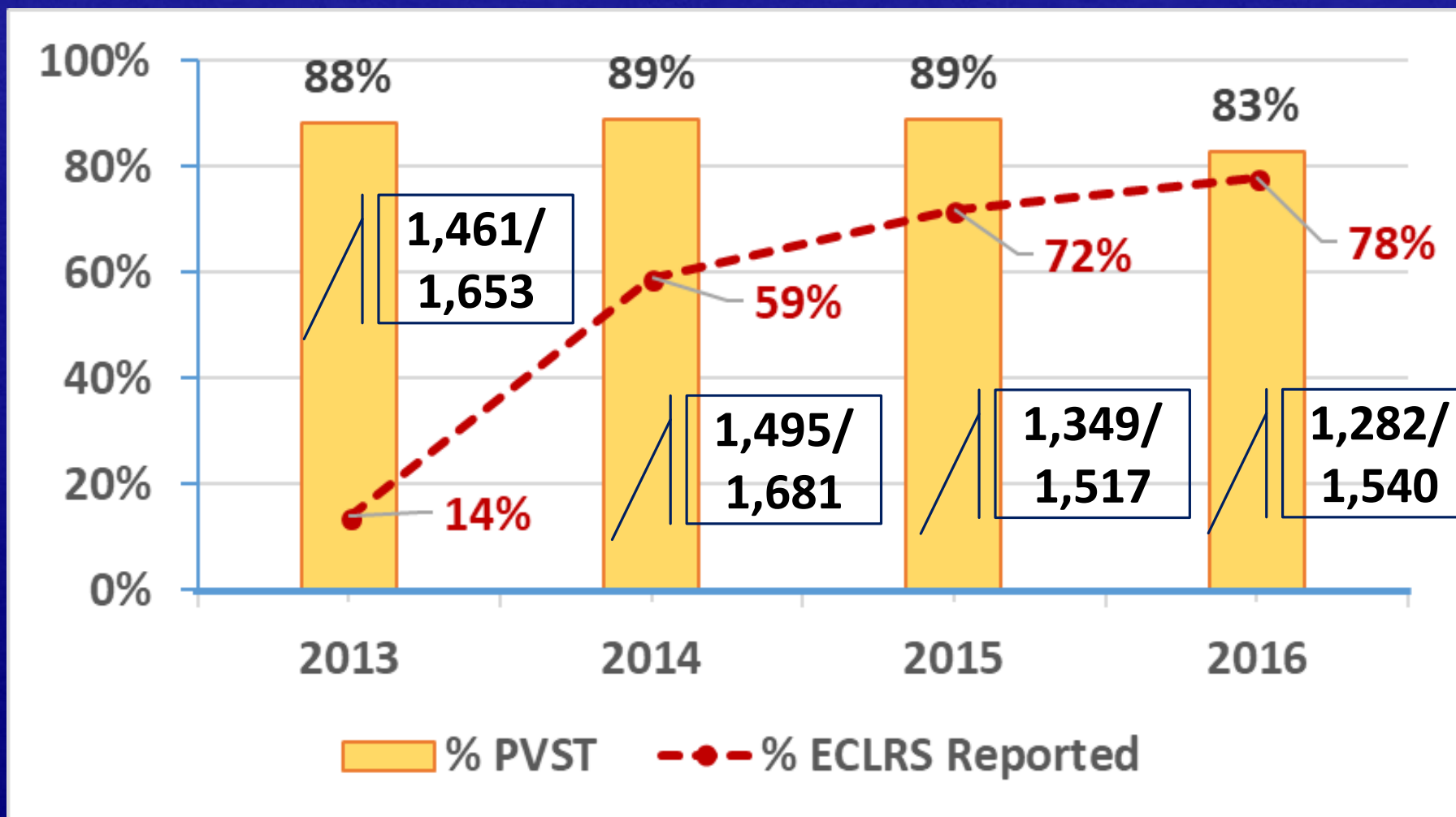
# PVST Interpretation and Documentation

Reason for testing 	<b>Post Vaccination Testing</b>
* What is the interpretation of testing?	<b>Immune</b> 
Date of interpretation	<b>5/25/2018</b>
Test result documentation obtained by:	 
Was this person tested at the same facility where the final dose was administered?	
Was this person tested early?	
PVS Completed outside of NYC	

# % PVST Documented: CDC Annual Reports\* Infants Born 2013 - 2016



# % PVST Documented and % by ECLRS\* Infant Births^ 2013 - 2016



# Workflow Specifications

## PVS Testing Reminder

- Child is  $\geq$  244 - 258 days old (8 months old)
- Child has received at least three doses of vaccine
  - Final dose  $\geq$  168 days old (24 seven-day weeks)
- Test results not received
- PHA Activities
  - Send family and provider a reminder one month in advance of when child is due
  - Remind family and provider that child will have two tests – one for immunity and one for infection



# New York City Vaccine Preventable Disease Surveillance System

## Workflow Details - PVS Testing Reminder

### PVS Testing Reminder (Last Update: 05/21/2018 07:04 AM)

Event	Name	Birth Date (mm/dd/yyyy)	PHA assigned to event
<a href="#">100098505- Case Management</a>			Wan Leung
<a href="#">100095754- Case Management</a>			Doreen Simpson
<a href="#">100093810- Case Management</a>			Helene Su
<a href="#">100093143- Case Management</a>			Doreen Simpson
<a href="#">100092915- Case Management</a>			Wan Leung
<a href="#">100092858- Case Management</a>			Dan Ting Chen
<a href="#">100092853- Case Management</a>			Dan Ting Chen
<a href="#">100092837- Case Management</a>			Wan Leung
<a href="#">100092792- Case Management</a>			Dan Ting Chen
<a href="#">100092746- Case Management</a>			Helene Su
<a href="#">100092720- Case Management</a>			Doreen Simpson
<a href="#">100092702- Case Management</a>			Li Li
<a href="#">100092687- Case Management</a>			Helene Su
<a href="#">100092685- Case Management</a>			Myrna Lee
<a href="#">100092681- Case Management</a>			Willyhawk Huang
<a href="#">100092679- Case Management</a>			Myrna Lee
<a href="#">100092670- Case Management</a>			Helene Su
<a href="#">100092669- Case Management</a>			Helene Su
<a href="#">100092666- Case Management</a>			Helene Su

# Workflow Specifications

## PVS Testing Past Due

- Child is  $\geq$  275 days old (9 months)
- Child has received at least three doses of vaccine
  - Final dose  $\geq$  168 days old (24 seven-day weeks)
- Test results not received
- PHA Activities
  - Call family to advise that child is tested as soon as possible. Assist with making the appointment.
  - Call pediatrician and fax reminder
  - Remind both family and provider that child needs two tests – one for immunity and one for infection

# New York City Vaccine Preventable Disease Surveillance System

## Workflow Details - PVS Testing Past Due

### PVS Testing Past Due (Last Update: 05/21/2018 06:06 AM)




Event	Last Update	Name	Birth Date (mm/dd/yyyy)	PHA assigned
100091855- Clinical	05/03/2018			Eman Bassily
100091825- Clinical	03/30/2018			Dan Ting Cher
100091807- Clinical	05/03/2018			Helene Su
100091767- Clinical	03/28/2018			Tingting Gu-te
100091737- Clinical	03/05/2018			Helene Su
100091699- Clinical	04/10/2018			Doreen Simps
100091694- Clinical	05/15/2018			Myrna Lee
100091693- Clinical	05/09/2018			Myrna Lee
100091691- Clinical	03/05/2018			Dan Ting Cher
100091690- Clinical	03/07/2018			Wan Leung
100091689- Clinical	03/06/2018			Tingting Gu-te
100091676- Clinical	05/15/2018			Myrna Lee
100091656- Clinical	03/05/2018			Helene Su
100091614- Clinical	03/26/2018			Helene Su
100091569- Clinical	03/13/2018			Helene Su
100091568- Clinical	04/03/2018			Dan Ting Cher
100091563- Clinical	05/15/2018			Myrna Lee

# Record of Contact Preferences

Contact Preferences			
<u>Mail</u>	<input type="checkbox"/> May Use	<input checked="" type="checkbox"/> <b>Do Not Use</b>	<input type="checkbox"/> Use for Reminders
<u>Text</u>	<input type="checkbox"/> May Use	<input type="checkbox"/> Do Not Use	<input type="checkbox"/> Use for Reminders
<u>Email</u>	<input type="checkbox"/> May Use	<input type="checkbox"/> Do	<input checked="" type="checkbox"/> <b>For Reminders</b>
<u>Cell Ph</u>	<input checked="" type="checkbox"/> <b>May Use</b>	<input type="checkbox"/> Not Use	<input type="checkbox"/> Use for Reminders
<u>Home Ph</u>	<input type="checkbox"/> May Use	<input type="checkbox"/> Do Not Use	<input type="checkbox"/> Use for Reminders
<u>Work Ph</u>	<input type="checkbox"/> May Use	<input type="checkbox"/> Do Not Use	<input type="checkbox"/> Use for Reminders



# Reminders Log

Reminders Log	
Sent reminders to pediatrician and mother about the final dose	<input checked="" type="radio"/> Yes <input type="radio"/> Not applicable
Date	12/05/2018 
Placed reminder call/text to mother about the final dose	<input checked="" type="radio"/> Yes <input type="radio"/> Not applicable
Date	12/05/2018 
<b>Sent reminder to pediatrician and mother about PVST</b>	<input checked="" type="radio"/> Yes <input type="radio"/> Not applicable
	<b>3/5/2018</b>
Placed reminder call/text to mother about the PVS	<input checked="" type="radio"/> Yes <input type="radio"/> Not applicable
Date	03/05/2018 

# Summary

- Educating patients and provider on why and how PVST should be conducted may help to avoid PVST errors
- Mandating electronic laboratory reporting for PVST has proved to be very beneficial
  - Reports are received without active case management including for cases that have been closed
  - Case Management is more efficient
- Electronic tracking and reminder systems for vaccination and PVST documentation are very helpful and effective

# Next Steps

- Disseminate Provider Reference Sheet
  - Laminated and will be available to download
- Advocate for laboratories to offer PVST panel
  - Requires resources and time from labs
  - Will decrease PVST ordering errors
- Enforce laboratory reporting requirement
  - Some labs still reporting only HBsAg or only HBsAg
- Improve workflows and reports in Maven
  - Separate reminder logs for providers and link to workflows



# Acknowledgments

- **PHBP – Public Health Advisors**
- **Ariba Hashmi, MPH**  
**PHBP Unit Epidemiologist**
- **Jen Rosen, MD**  
**Director of VPD Surveillance**
- **Rob Arciuolo, MPH\***  
**Epidemiologist, VPD Surveillance**
- **Jane R. Zucker, MD, MSc**  
**BOI Assistant Commissioner**





NYC DOHMH PHBP Unit Staff

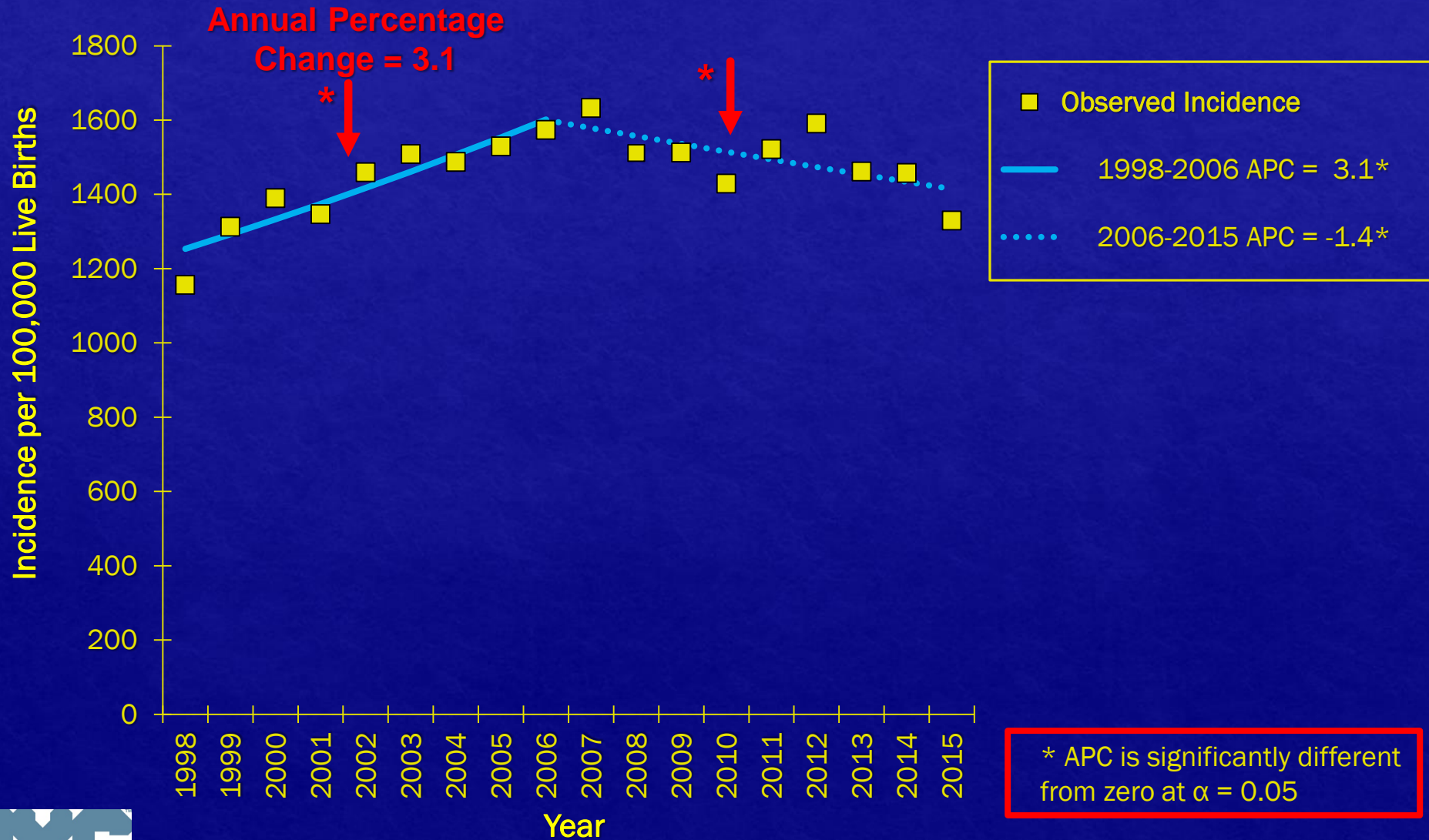
# EXTRA SLIDES



# NYC Identified Births vs. CDC Expected Birth Tables

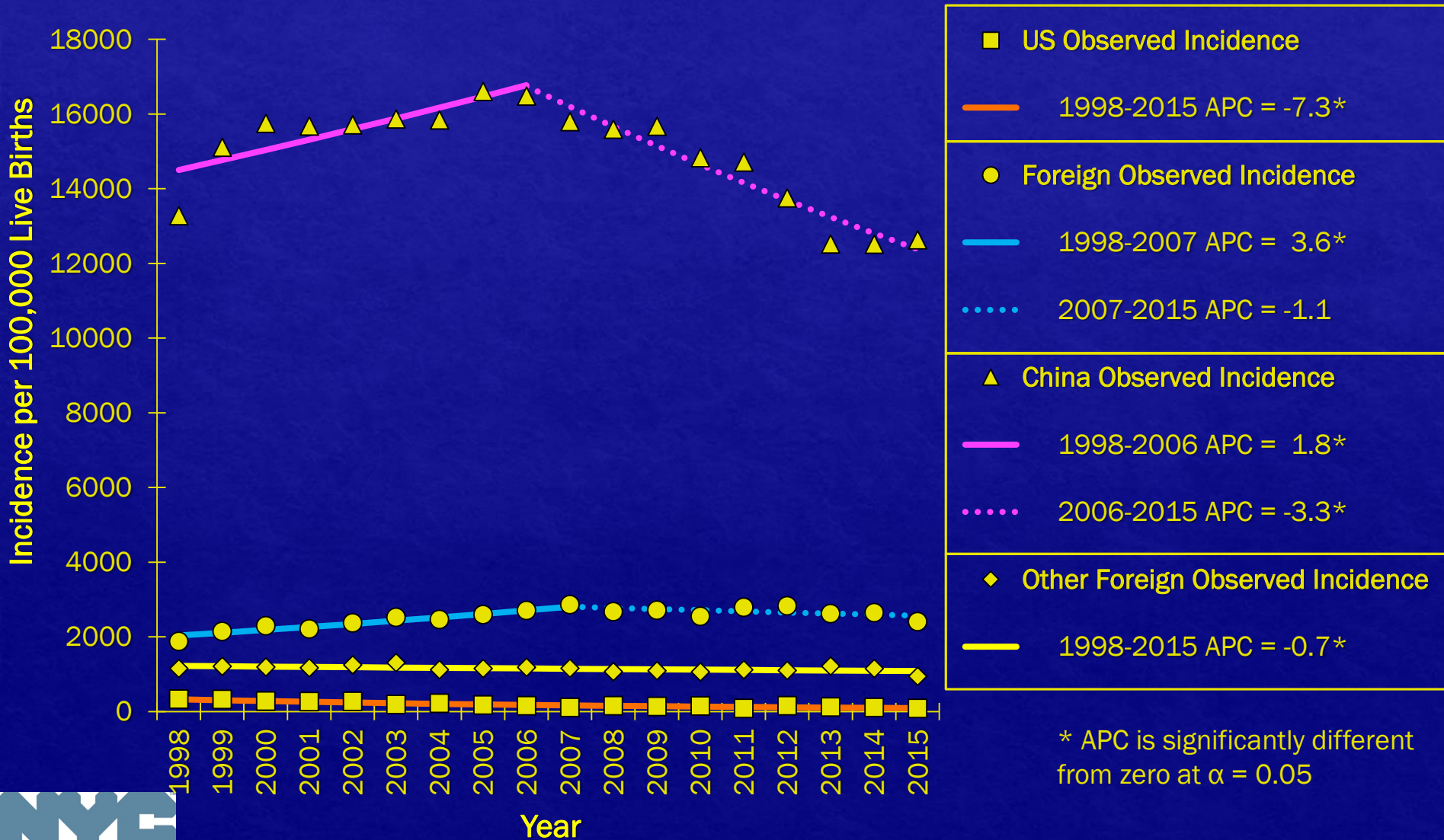
Measure	2011	2012	2013	2014	2015*
Identified Births	1684	1842	1600	1657	1517
Expected Point Estimate	1775	1896	1776	1837	1399
Identified/Point Estimate	95%	97%	90%	90%	92%
Expected Lower Limit	1378	1483	1384	1436	1249
Identified/Lower Limit	122%	124%	116%	115%	121%

# INCIDENCE OF BIRTH TO HBV-INFECTED WOMEN



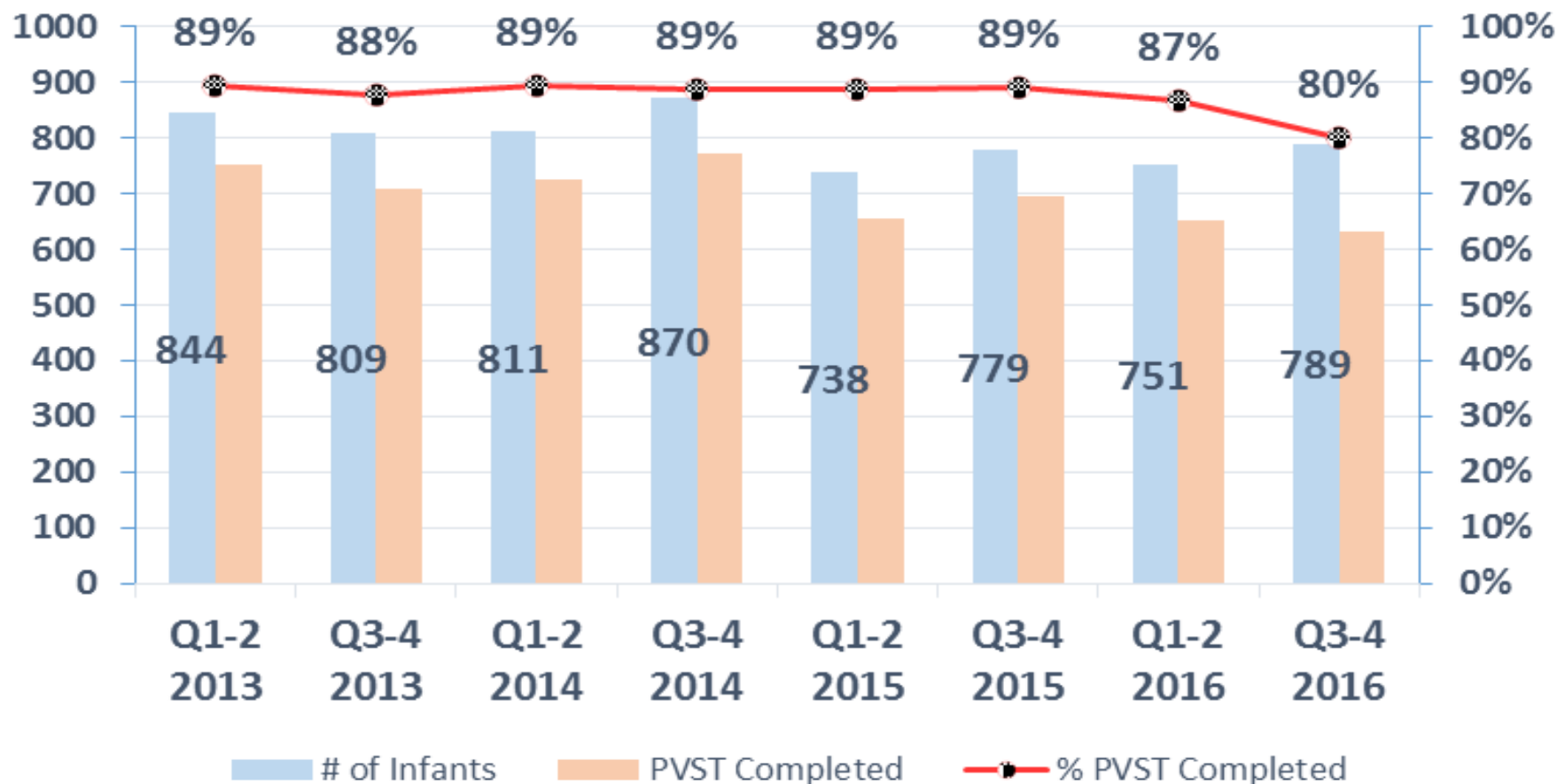


# INCIDENCE BY COUNTRY OF BIRTH



\* APC is significantly different from zero at  $\alpha = 0.05$

# PVST Completed Infants Born 2013 – 2016 – By Quarter



# References

- *Robert J. Arciuolo, MPH, CPH; Julie E. Lazaroff, MPH; Jennifer B. Rosen, MD; Sungwoo Lim, DrPH; Jane R. Zucker, MD, MSc, Trends in Hepatitis B Surveillance Among Pregnant Women, New York City, 1998-2015*

# Avoid Testing Too Early

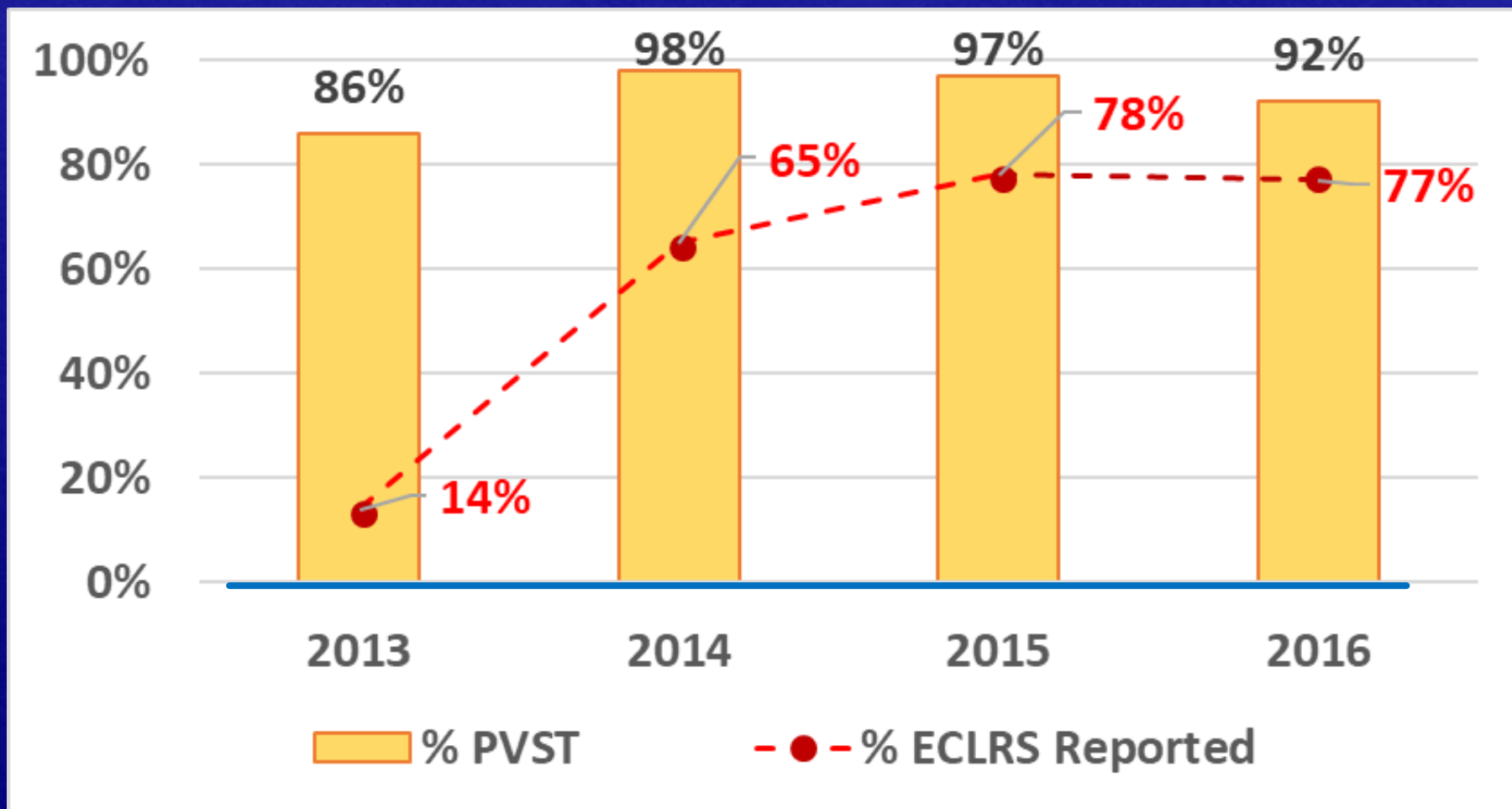
- PVST should not be performed earlier than 9 months of age
  - Avoid detection of passive anti-HBs from HBIG
  - Increase ability to detect a late onset of infection
- Testing for HBsAg < one month after vaccination may result in a false HBsAg+
  - Hep B vaccine contains the HBsAg



# Avoid Testing Too Late

- Testing for anti-HBs should not be delayed unnecessarily after the final dose.
  - Anti-HBs titers may wane, but there is still protection from persistent cellular immunity
  - Anti-HBs titer decline may occur as early as two to six months following vaccination.
  - Delaying testing may result in unnecessary revaccination in a child who has cellular immunity.

# % PVST Documented and % by ECLRS Without Infants Who Moved to China



# % PVST Documented and % by ECLRS With only Infants Who Moved to China

